

(12) UK Patent Application (19) GB (11) 2 350 443 (13) A

(43) Date of A Publication 29.11.2000

(21) Application No 9911845.7

(22) Date of Filing 22.05.1999

(71) Applicant(s)
Luk Lamellen und Kupplungsbau GmbH
(Incorporated in the Federal Republic of Germany)
Industriestrasse 3, Postfach 1380, 77815 Bühl, Baden,
Federal Republic of Germany

(72) Inventor(s)
Diana Katharine Bowker

(74) Agent and/or Address for Service
Anthony Cundy & Co
1 Olton Bridge, 245 Warwick Road, SOLIHULL,
West Midlands, B92 9AH, United Kingdom

(51) INT CL⁷
G01R 31/00, G01M 15/00

(52) UK CL (Edition R)
G3N NGK1V1 N286C N404

(56) Documents Cited
GB 2290631 A DE 019725916 A DE 019725915 A
US 5541840 A
Heavy Duty Trucking, 1994, pages 90-93, see Abstract.

(58) Field of Search
UK CL (Edition Q) G3N NGK1V1 NGK1V2 NGK1V3
INT CL⁶ G01M 15/00, G01R 31/00
ONLINE: EPODOC, JAPRO, WPI, DIALOG DIAINDEX
category TRANSPORT

(54) Abstract Title
Diagnostic system, particularly for motor vehicles

(57) A processor-based diagnostic system includes a series of electronic pages (P_1 - P_N), each page defining a series of active areas (A_1 - A_N) representative of different diagnostic topics, the active areas (A_1 - A_N) of each page (P_1 - P_N) being interlinked with another page (P_1 - P_N) relating to the diagnostic topic defined by the active area (A_1 - A_N), so that by selection of appropriate diagnostic topics, an operator can be taken, step-by-step through a diagnostic procedure. The system may be accessed remotely from a centralised computer, particularly via the internet. An interface may be provided for direct connection to the ECU of a system under test, which may be a motor vehicle. The active areas (A_1 - A_N) may provide for direct connection to common pages of the system, and may give direct links to provide a readout from a diagnostic system associated with an ECU under test.

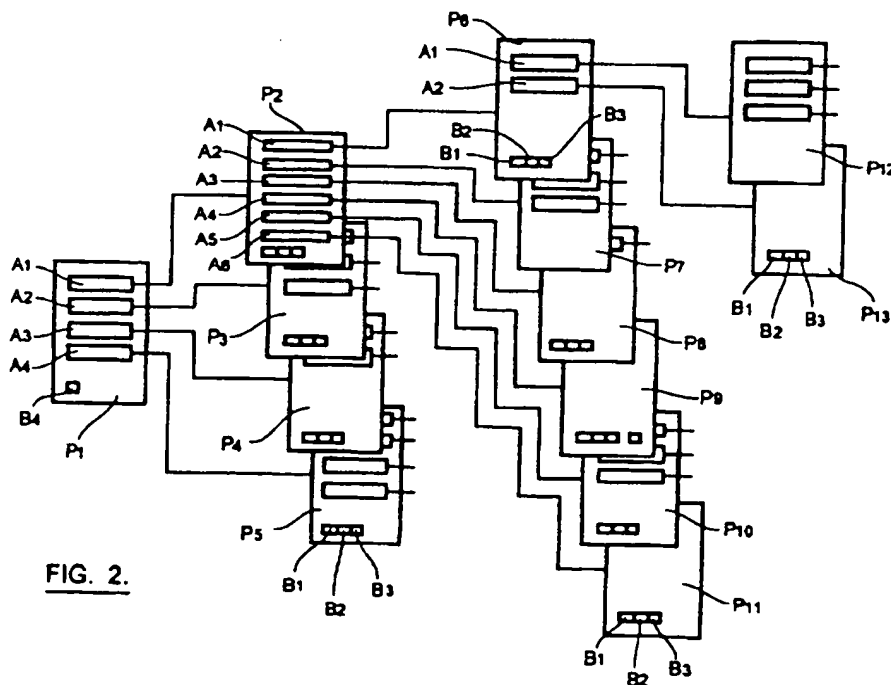


FIG. 2.

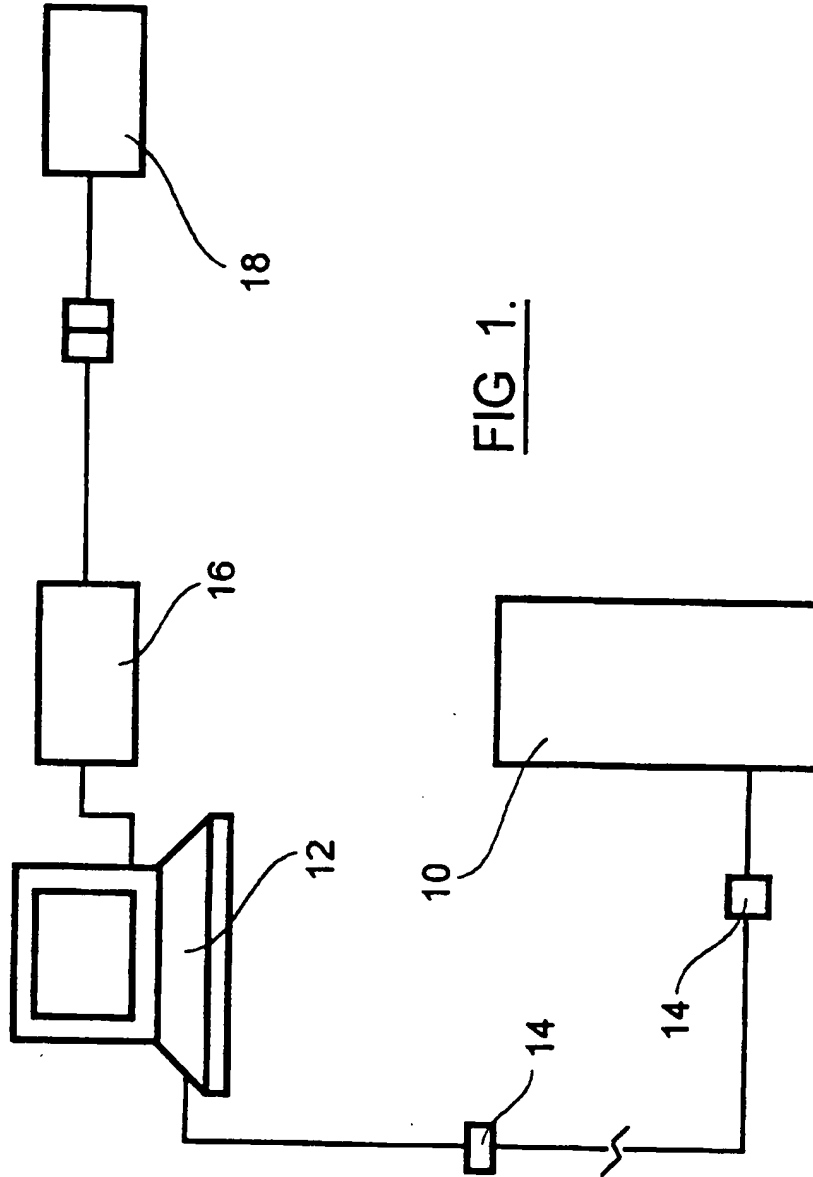


FIG 1.

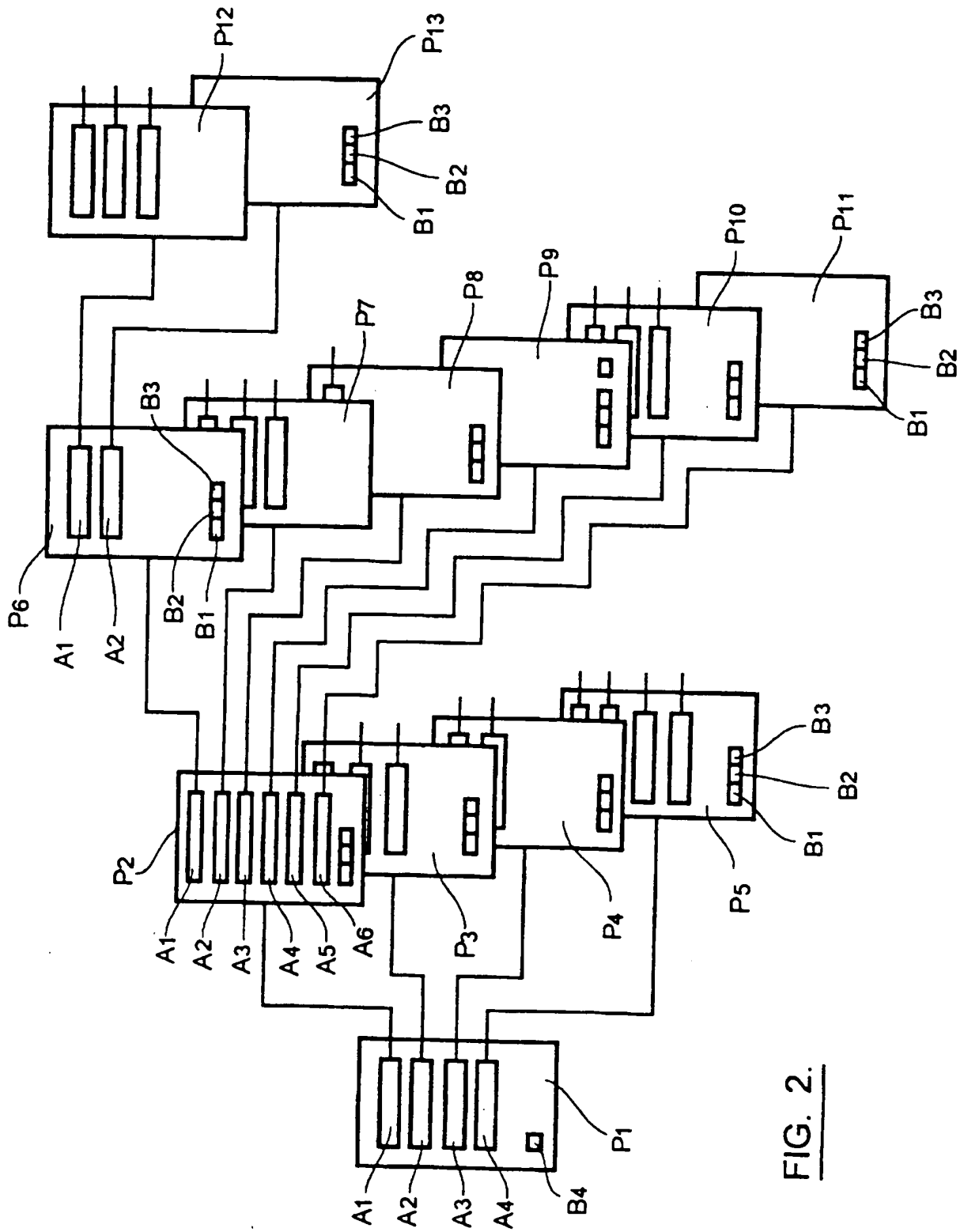


FIG. 2.

DIAGNOSTIC SYSTEMS

The present invention relates to diagnostic systems and in particular diagnostic systems for motor vehicles.

5 In accordance with one aspect of the present invention a processor based diagnostic system comprises a series of electronic pages, each page defining a series of active areas, each active area being representative of a diagnostic topic, each active area being interlinked with another page relating to the diagnostic topic associated with said area, whereby, by selection of appropriate diagnostic topics an operator can be taken step by
10 step through a diagnostic procedure.

The diagnostic topics represented by the active areas may relate to the system that is being diagnosed, symptoms of faults occurring in a particular system, or tests to be carried out in diagnosing a fault in a system.

15 The diagnostic system of the present invention may be loaded into a computer or accessed remotely through, for example, the Internet. Means may also be provided for direct connection of the diagnostic system to a system under test, by means of which information, for example fault codes or data relating to tests performed as part of the diagnostic
20 procedure, may be inputted directly into the diagnostic system.

An embodiment of the invention is now described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a diagrammatic view of a diagnostic system in accordance with the present invention; and

Figure 2 illustrates a typical diagnostic procedure, in accordance with the present invention.

As illustrated in Fig. 1 the diagnostic system is loaded onto a web server 10 which is connected to a remote PC 12 via a modem 14 and the Internet. The remote PC 12 has an interface 16 by which the PC 12 may be connected to an ECU 18 of the motor vehicle. The ECU 18 may, for example, control an automatic transmission system of the motor vehicle.

As illustrated in Fig. 2, the diagnostic system comprises a series of HTML pages P_1 to P_N , each page having a series of active areas A_1 to A_N . Hyper links are provided between the active areas A_1 to A_N of one page P_1 to P_N and subsequent pages P_2 to P_N .

The active areas A_1 to A_N of each page P_1 to P_N represent different diagnostic topics. For example, for a diagnostic system for diagnosing faults in an automatic transmission system of a motor vehicle, P_1 may be divided into areas A_1 to A_4 representing sub-systems of the transmission system. For example:-

- A_1 may represent a clutch actuation system;
- A_2 a gear selection system;
- A_3 a hydraulic power supply system; and
- A_4 an electronic control system.

Each of the active areas A_1 to A_4 of page P_1 are linked to further pages P_2 to P_6 respectively, each of the pages P_2 to P_6 having active areas A_1 to A_N which are in turn linked to further pages. For example, page P_2 may have six active areas A_1 to A_6 , areas A_1 to A_6 of page P_2 being linked to further pages P_6 to P_{11} respectively. Similarly, pages P_6 to P_{11} have active areas which are in turn linked to further pages.

Areas A_1 to A_6 of page P_2 may, for example, represent different fault systems relating to the clutch actuation system, for example:-

- 5
- A_1 clutch disengages unexpectedly during driving in gear;
 - A_2 clutch doesn't always engage during driving when selecting a gear;
 - A_3 clutch remains engaged and causes a stall;
 - A_4 clutch is sometimes hard to disengage for a gear shift;
 - A_5 clutch behaves strangely during start from rest;
 - A_6 the engine will not start.

10 Pages P_6 to P_{11} may then give further information as to possible causes of the symptom selected on page P_2 , giving for example further symptoms to look for and tests to carry out which may be represented by further active areas A_1 to A_N .

15 Each of the pages P_2 to P_N may include further active areas or 'buttons' B_1 to B_N which provide additional links with other pages in the system. For example pages P_2 to P_N may have 'buttons' B_1 to B_3 .

- 20
- B_1 providing a direct link with a fault code page which lists all fault codes that may be generated by the system ECU and provides a link with individual pages relating to each code,
 - B_2 providing a direct link with the main menu page P_1 , and
 - B_3 providing a direct link with a test procedure relating to the specific fault symptom on the page in question.

25 Moreover the pages, in particular page P_1 , may include a button B_4 which provides a direct link with the ECU diagnostic system to provide a direct read out of any fault codes generated by the ECU diagnostic system, the current settings of the ECU etc.

Active areas or buttons may also be provided on selected pages to provide links to data files relating to the system and/or vehicle under test by which information relating to the vehicle/system may be accessed, for example:-

- 5 vehicle manufacturer;
- vehicle model and identifying features;
- specific system features available;
- original clutch clamped position at calibration;
- number of clutch actuations performed during vehicle life;
- 10 maximum permitted clutch speed;
- assumed idle speed;
- maximum clutch torque capability;
- clutch physical parameters;
- gear ratios;
- 15 differential ratio;
- clutch dropout speed;
- fault history.

By selection of appropriate active areas A_1 to A_N on successive pages P_1 to P_N , the operator is taken step by step through a diagnostic procedure, until a fault is identified.

At each stage in the diagnostic procedure, direct input from the ECU 18 controlling the system under investigation, may be used to select an appropriate area A_1 to A_N . For example, if areas A_1 to A_3 of page P_2 represent fault codes, the fault codes may be read directly from the ECU 18, to make an appropriate selection on page P_2 . Furthermore, where tests are carried out, the resulting operating parameters may be read directly from the ECU 18, to initiate further stages of the diagnostic process.

Where the operative is unable to correct the fault, the system may also provide a direct link via the Internet with a centralised diagnostic centre from which further assistance may be obtained.

Various modifications may be made without departing from the invention.

5 For example, in the embodiment described, it is assumed that the sub-system at fault can be identified. If this is not the case, then the entry page of the diagnostic system should have active areas relating to, for example, fault symptoms. It may consequently be advantageous to provide a front page with a menu of different entry pages to the system.

10 While the present invention has been described with reference to an automatic transmission system of a motor vehicle, it is applicable to other systems of motor vehicles or to fault diagnostic systems in general.

15 While in the above system data is inputted directly from the ECU 18 of the system under investigation, such information may be inputted manually or using pre-recorded files.

CLAIMS

1. A processor-based diagnostic system comprising a series of electronic pages, each page defining a series of active areas, each active area being representative of a diagnostic topic, each active area being
5 interlinked with another page relating to the diagnostic topic associated with said area, whereby, by selection of appropriate diagnostic topics, an operator can be taken step-by-step through a diagnostic procedure.
2. A diagnostic system according to Claim 1 in which the diagnostic system is accessed remotely, from a centralised computer.
- 10 3. A diagnostic system according to Claim 2 in which the diagnostic system is accessed via the Internet.
4. A diagnostic system according to any one of the preceding claims in which an interface is provided for direct connection to the ECU of the system under test.
- 15 5. A diagnostic system according to any one of the preceding claims in which active areas are provided for direct connection of pages to common pages of the system.
6. A diagnostic system according to any one of the preceding claims in which active areas are provided to give direct links to provide a readout
20 from a diagnostic system associated with the ECU of the system under test.
7. A diagnostic system substantially as described herein with reference to and as shown in Figures 1 and 2 of the accompanying drawings.



Application No: GB 9911845.7
Claims searched: 1-7

Examiner: Dave Mobbs
Date of search: 27 August 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): G3N NGK1V1, NGK1V2, NGK1V3.

Int CI (Ed.6): G01M 15/00; G01R 31/00.

Other: ONLINE: EPODOC, JAPIO, WPI, DIALOG DIALINDEX category
TRANSPORT.

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2,290,631 A (FUJI JUKOGYO KABUSHIKI KAISHA) - whole document, particularly pages 16-18.	1, 2, 4 and 6.
Y	US 5,541,840 (CHRYSLER CORPORATION) - whole document, particularly columns 13-14.	1, 2, 4 and 6.
Y	DE 19725915 (DAIMLER-BENZ AKTIENGESELLSCHAFT) - whole document.	1-3.
Y	DE 19725916 (DAIMLER-BENZ AKTIENGESELLSCHAFT) - whole document.	1-3.
Y	Heavy Duty Trucking, 1994, pages 90-93, Hris H., Super Shop: Ryder ushers in a new era of truck maintenance. See abstract, section 4).	1- 2.

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.